

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage(1) 2N3013 2N3014	V _{CEO}	15 20	Vdc
Collector-Emitter Voltage	V _{CES}	40	Vdc
Collector-Base Voltage	V _{CBO}	40	Vdc
Emitter-Base Voltage	V _{EBO}	5.0	Vdc
Collector Current — Continuous (10 μs pulse) Peak	I _C	200 500	mAdc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	0.36 2.06	Watt mW/°C
Total Device Dissipation @ T _C = 25°C @ T _C = 100°C Derate above 25°C	P _D	1.20 0.68 6.85	Watts Watt mW/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200	°C

(1) Applicable from 0.01 mA to 10 mA (Pulsed)

**2N3013
2N3014**

**2N3013 JAN, JTX AVAILABLE
CASE 27, STYLE 1
TO-52 (TO-206AC)**

SWITCHING TRANSISTOR

NPN SILICON

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Refer to 2N3510 for graphs.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I _C = 100 μAdc, V _{BE} = 0)	V _{(BR)CES}	40	—	Vdc
Collector-Emitter Sustaining Voltage(2) (I _C = 10 mAdc, I _B = 0)	V _{CEO(sus)}	15 20	— —	Vdc
Collector-Base Breakdown Voltage (I _C = 100 μAdc, I _E = 0)	V _{(BR)CBO}	40	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 100 μAdc, I _C = 0)	V _{(BR)EBO}	5.0	— —	Vdc
Collector Cutoff Current (V _{CE} = 20 Vdc, V _{BE} = 0) (V _{CE} = 20 Vdc, V _{BE} = 0, T _A = +125°C)	I _{CES}	— —	0.3 40	μAdc
Base Current (V _{CE} = 20 Vdc, V _{BE} = 0)	I _B	—	0.3	μAdc

ON CHARACTERISTICS(2)

DC Current Gain (I _C = 30 mAdc, V _{CE} = 0.4 Vdc) (I _C = 100 mAdc, V _{CE} = 0.5 Vdc) (I _C = 10 mAdc, V _{CE} = 0.4 Vdc) (I _C = 300 mAdc, V _{CE} = 1.0 Vdc) (I _C = 100 mAdc, V _{CE} = 1.0 Vdc) (I _C = 30 mAdc, V _{CE} = 0.4 Vdc, T _A = -55°C)	h _{FE}	30 25 25 15 25 12	120 — — — — —	—
Collector-Emitter Saturation Voltage (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc) (I _C = 300 mAdc, I _B = 30 mAdc) (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 30 mAdc, I _B = 3.0 mAdc, T _A = +125°C)	V _{CE(sat)}	— — — — — —	0.18 0.28 0.35 0.50 0.18 0.25	Vdc
Base-Emitter Saturation Voltage (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc) (I _C = 300 mAdc, I _B = 30 mAdc) (I _C = 10 mAdc, I _B = 1.0 mAdc)	V _{BE(sat)}	0.75 — — 0.70	0.95 1.20 1.70 0.80	Vdc

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product ($I_C = 30 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	350	—	MHz
Output Capacitance ($V_{CB} = 5.0 \text{ Vdc}$, $I_E = 0$, $f = 140 \text{ kHz}$)	C_{obo}	—	5.0	pF
Input Capacitance ($V_{BE} = 0.5 \text{ Vdc}$, $I_C = 0$, $f = 140 \text{ kHz}$)	C_{ibo}	—	8.0	pF
SWITCHING CHARACTERISTICS				
Storage Time ($I_C = I_{B1} = I_{B2} = 10 \text{ mAdc}$)	t_s	—	18	ns
Turn-On Time ($V_{EB(\text{off})} = 5.0 \text{ V}$, $V_{CC} = 15 \text{ V}$, $I_C = 300 \text{ mAdc}$, $I_{B1} = 30 \text{ mAdc}$) 2N3013 ($V_{EB(\text{off})} = 0$, $V_{CC} = 2.0 \text{ V}$, $I_C = 30 \text{ mAdc}$, $I_{B1} = 3.0 \text{ mAdc}$) 2N3014	t_{on}	—	15	ns
		—	16	
Turn-Off Time ($V_{CC} = 15 \text{ V}$, $I_C = 300 \text{ mAdc}$, $I_{B1} = I_{B2} = 30 \text{ mAdc}$) 2N3013 ($V_{CC} = 2.0 \text{ V}$, $I_C = 30 \text{ mAdc}$, $I_{B1} = I_{B2} = 3.0 \text{ mAdc}$) 2N3014	t_{off}	—	25	ns
		—	25	

(2) Pulse Test: Pulse Width = $300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.